



# INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG

Department of Computer Science & Engineering (CSE)

## Assignment

<b>Course Code:</b>	CSE-3631
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## **1. Short note :**

### **a. Kernel:**

A kernel is the foundational layer of an operating system (OS). It functions at a basic level, communicating with hardware and managing resources, such as RAM and the CPU.

Since a kernel handles many fundamental processes, it must be loaded at the beginning of the boot sequence when a computer starts up. The kernel performs a system check and recognizes components, such as the processor, GPU, and memory. It also checks for any connected peripherals. As the OS loads and the graphical user interface appears, the kernel keeps running. Even after the OS has fully loaded, the kernel continues to run in the background, managing system resources.

### **b. virtual machine:**

Virtual Machine abstracts the hardware of our personal computer such as CPU, disk drives, memory, NIC (Network Interface Card) etc, into many different execution environments as per our requirements, hence giving us a feel that each execution environment is a single computer. For example: Virtual Box.

When we run different processes on an operating system, it creates an illusion that each process is running on a different processor having its own virtual memory, with the help of CPU scheduling and virtual-memory techniques. There are additional features of a process that cannot be provided by the hardware alone like system calls and a file system. The virtual machine approach does not provide these additional functionalities but it only provides an interface that is same as basic hardware. Each process is provided with a virtual copy of the underlying computer system.

## 2. Main difference between direct and indirect inter-process communication is given below.

### a. Direct inter-process communication:

In the Direct Communication, each process that wants to communicate must explicitly name the recipient or sender of the communication. In this scheme, the **send and receive** primitives are defined as follows:

**Send (P, message)** - Send a message to process P.

**Receive (Q, message)** - Receive a message from process Q.

### b. Indirect inter-process communication:

In the Indirect Communication, the messages are sent to and received from mailboxes. A mailbox can be viewed abstractly as, an object into which messages can be placed by processes and from which messages can be removed. The send and receive primitives are defined as follows:

**Send (A, message)** - Send a message to mailbox A.

**Received (A, message)** - Receive a message from mailbox A.